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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,867	04/29/2002	Masanori Kimura	81839.0105	8937

26021 7590 06/11/2003

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EXAMINER

ANDERSON, MATTHEW A

ART UNIT	PAPER NUMBER
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1765

6

DATE MAILED: 06/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/030,867

Applicant(s)

KIMURA, MASANORI

Examiner

Matthew A. Anderson

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 April 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al. (JP-02-221184).

Ito et al. discloses a method for growing a semiconductor single crystal by the Czochralski (Cz hereafter) pulling method. A quartz crucible is filled with raw material and heated to form a melt. Side heaters (3) and bottom heaters (4) are used in the heating process. A seed crystal is then contacted with the melt and slowly pulled up to from a single crystal ingot. A chamber (1) surrounds the crucible and heaters. The heaters are powered as shown by Fig. 2 before the pulling of the crystal has used more than 60% of the raw material melt.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2,4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito et al in view of Yamagishi et al. (JP-09175889) and Nagai et al. (JP-08-143392).

Ito et al. is described above.

Ito et al. does not explicitly disclose the thermal gradient and the raw material replenishment details.

Yamagishi et al. discloses keeping a Cz pulling furnace thermal environment constant. The furnace has two subsidiary bottom heaters which help the side heaters keep the conditions constant.

Nagai et al. discloses a raw material feeder which resupplies a molten material into a Cz puller.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine the methods above because both detail a Cz puller with subsidiary bottom heaters, Yamagishi et al. discloses the thermal conditions (i.e. thermal gradients) are kept constant, and Nagai et al. discloses the method of resupplying a Cz crucible with molten raw material.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to optimize the thermal gradients because Yamagishi et al. suggests that these should be held constant, such optimization would have been achieved with

only routine experimentation, and such optimization would have produced an expected result.

In respect to claims 4, it would have been obvious to one of ordinary skill in the art at the time of the present invention to resupply the crucible without solidifying the melt because such was described by Nagai et al. as possible and such would have reduced unneeded thermal expansion shock on the components of the Cz systems.

5. Claims 3,5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito as applied to claims 1,2,4 above, and further in view of Higo (JP-07-133187)

Ito is described above.

Ito et al. does not disclose the claimed method of analyzing the heat transfer to control the electric power supplied to the heaters.

Higo et al. discloses a temperature gradient calculated in a Cz puller for use in controlling the thermal gradients within the furnace.

It would have been obvious to one of ordinary skill in the art at the time of the present invention to combine Ito et al. and Higo because Higo et al. suggests that this allows single crystals free from deformation to be pulled from the Cz puller.

In respect to claim claims 3,5, it would have been obvious to one of ordinary skill in the art at the time of the present invention to conduct thermal gradient analysis within a Cz puller to obtain control values for heater control because Higo suggests such analysis as a way of obtaining single crystals free from deformation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew A. Anderson whose telephone number is (703) 308-0086. The examiner can normally be reached on M-Th, 6:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

MAA
June 9, 2003

Matthew Anderson
A.U. 1765